

CASE STUDY: **SUSTAINABLE BUILDING DESIGN**

## CIC Start Online

**CIC Start Online aims to embed sustainable building design and refurbishment into practice. A three-year project, CIC Start Online is led by Glasgow Caledonian University in partnership with Edinburgh Napier University, Glasgow School of Art, Heriot Watt University, Robert Gordon University, the University of Edinburgh and University of Strathclyde. It is funded by the European Regional Development Fund and the Scottish Government's SEEKIT programme.**

Dr Branka Dimitrijevic, the CIC Start Online project director, said: "The project's aim is to embed sustainable building design and refurbishment into practice. Without faster adoption of innovations, it will be difficult to achieve the Scottish Government's targets for reduction of CO<sub>2</sub> emissions by 80% by 2050. The project assists Scottish small and medium sized enterprises (SMEs) to develop and test innovations at testing facilities of the project partners' institutions. The project was envisaged as a construction improvement club that focuses on sustainable building design and refurbishment."

The CIC Start Online team has developed a unique online conference focused on Sustainable Refurbishment. The online conferences allow companies in the sector to exhibit and network in a green, virtual event environment using web discussions, webinars and exhibition pavilion rooms. Conferences in the coming two years will focus on another key area of interest to the sector. Scottish SMEs operating in the construction sector are also eligible to promote products and services for sustainable building design and refurbishment on the CIC Start Online website.

The project also runs a scheme for joint industry/academic feasibility studies and a competition for free academic consultancy. An independent panel assesses applications submitted jointly by researchers and businesses for feasibility studies and applications submitted by businesses for academic consultancy. CIC Start Online aims to complete nearly 40 feasibility studies and academic consultancy projects during the three-year timescale.

Approved applications for feasibility studies so far have included "Tenament Flat Carbon Reduction Shopping List" by Holmes Partnership and "Upgrade Strategy Development for Garrioch Residents Association" by Collective Architecture. Approved academic consultancy includes "Enkilt Simple Living" by Ballyconnelly Construction Ltd.

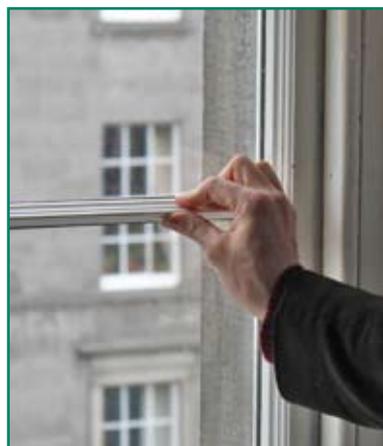
Academic consultancy projects at Glasgow Caledonian University include "Developing 'Homegrown' Natural Fibre Insulation Products" by Kraft Architecture and "Independent verification of a climate based worldwide building energy index" by IES Ltd.



## APPLIED KNOWLEDGE EXCHANGE

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The Environmental Chamber is a unique facility in the UK purchased with an award from the Science Research Investment Fund (SRIF 3). The SRIF 3 scheme in Scotland is a joint initiative involving resources from the Scottish Higher Education Funding Council (SHEFC) and the Office of Science and Technology (OST).



Kraft Architecture has been working on in-house research into the processes and manufacturing of natural fibre products using home-grown and waste fibres. Having identified prototyping facilities and waste material suppliers, and carried out market research into demand, Kraft wishes to prototype the product and undertake testing. This project is focused primarily on the use of the climatic chamber facility in Caledonian University's Centre for Research on Indoor Climate and Health (RICH) to test the thermal performance, vapour diffusion, resistance co-efficient of prototype natural fibre insulation products consisting of various recycled waste textile and cellulose materials.

#### Testing facilities at Glasgow Caledonian University

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The chamber is designed to test the performance of building materials and components under the range of climate conditions experienced in the UK.

The chamber consists of two walk-in rooms, an "exterior" room which can be used to simulate outdoor weather and an "interior" room to simulate typical indoor environmental conditions. The aperture formed between the rooms can accommodate a wall up to 3m wide by 2.4m high. By moving the interior room different wall thicknesses can be constructed. The exterior room also has the facilities to simulate driving rain and solar radiation (using infra-red lamps) on a wall surface. Both rooms can be pressurised.

The temperature and humidity in both rooms and the driving rainfall and infra-red lamps are fully controllable from either built-in controllers or a PC. For example, a typical daily cycle of winter climate can be programmed to run in the exterior room including rainfall to investigate moisture penetration in historic wall constructions, whilst the interior room is set to follow a typical heating pattern using the results from the monitoring of real buildings. Other techniques such as Thermography can also be applied in the chamber to gain additional information.

Recent projects include research funded by Historic Scotland and English Heritage to evaluate methods of improving the thermal efficiency of traditional timber windows.

Glasgow Caledonian University also has the facilities to measure the thermal conductivity of insulation products and materials such as stone and ceramics with higher thermal conductivities. The Lasercomp Fox314 is suitable for insulating materials with a maximum thickness of 102mm. The Lasercomp Fox50 is designed for testing the thermal conductivity of materials in the conductivity range of 0.1W/mK to 10W/mK. The maximum sample thickness is 25mm.

There are also facilities for Vapour Permeability Testing and X-ray absorption which enables high resolution moisture content measurements under transient conditions, such as the wetting and drying behaviour of sandstone.